Remarks

Drawings

Attached is a letter to the Draftsperson of the Patent Office submitting (1) a new Figure 3 which shows the frame structure as recited in independent claims 1 and 9 and (2) a corrected Figure 2, wherein reference sign 76 has been replaced by reference number 75 (shown in red).

Claim Objections

Claims 4, 10, 11, and 13 are cancelled.

Claim 9 is amended to recite "embedding said data into".

Claim Rejections 35 USC 112 (1)

Claims 1-14 are rejected in that the specification lacks details as to how a data link layer is matched to a standardized medium-independent interface or what qualifications of the data link layer would be used to match it to a particular standardized medium-independent interface.

The specification and the claims contain all relevant information and features in order to allow a person skilled in the art to make or use the invention.

The invention relates to a fieldbus component which can be, according to claims 1 and 9, directly - **without a bridge** - connected to a high speed data transmission medium (see Figure 1).

The fieldbus component has been implemented on the basis of the known OSI reference model. Page 2, lines 15 to 21 of the specification (Summary o the Invention) reads as follows:

"According to the invention, the fieldbus component has a data link layer (this corresponds to layer 2 of the OSI reference model) and a physical layer (this corresponds to the first layer of the OSI reference model)."

Furthermore, the fieldbus component can contain all seven OSI layers as disclosed on page 3, last sentence in connection with Figure 2.

As is well known for a person skilled on the field of computer networks, the data link layer offers a data structure (frame) to the physical layer for transmitting the data over a transmission medium.

Andrew S. Tanenbaum discloses on pages 16 and 17 in his book "Computer Networks, 1981, by Prentice-Hall, Inc., Englewood Cliffs, N.J. 07632) the ISO OSI reference model and for example the function of the physical and data link layer (Annex 1 to the Amendment). This book is known by a person skilled in the art and thus, the reasonable skilled person is aware that data coming from the data link layer must have a specific form to be processed by the physical layer. The specific data structure depends on the communication protocol to be used. Therefore, the knowledge of the specific data structure is basically not necessary for the understanding of the function of the data link layer and the physical later. Nevertheless, the present invention shows a matched data structure as depicted in new Figure 3. Figure 3 shows that fieldbus protocol data coming from the data link layer are embedded into a structure that can be received and processed by the physical later that is implemented with respect to a high speed transmission protocol such as Fast Ethernet. The Fast Ethernet frame contains a preamble, a start limiter field, a data field, now containing the data link layer fieldbus data and an end limiter (See page 5, lines 14-17 of the specification).

The present invention starts from a known fieldbus component which implements layers according to the OSI reference model wherein the layers, in particular the data link layer and the physical layer communicate on a fieldbus protocol. Therefore, the physical layer is adapted to accept fieldbus protocol-based data and send them to a fieldbus.

As to claim 1, the frame generated by the data link layer is based on a structure according to the fieldbus protocol (see new Figure 3). As mentioned above, known fieldbus components include fieldbus protocol-based physical layers, which are able to directly accept these frames for transmission.

The present invention offers a solution to provide a fieldbus component that is adapted to be used in a high speed data transmission, which is quite different from a fieldbus. In other words, a fieldbus component is claimed that can be directly - without a bridge or gateway - connected to a high speed transmission medium such as Fast Ethernet.

This object is solved by implementing in the fieldbus component a physical layer constituted for high speed data transmission. Therefore, the physical layer is not based on a fieldbus protocol but to a protocol adapted for high speed data transmission. Such a protocol is, for example, the IEEE 802.3u Standard of the Fast Ethernet according to claim 5 as originally filed.

Therefore, it is an object of the present invention to allow a communication within the fieldbus component between the data link layer and the physical layer each using a different communication protocol. This is achieved by adding a matching later which generates a frame acceptable for the physical layer constituted for high speed data transmission. Such a frame is illustrated as an example in new Figure 3.

Although, the Applicant considers former claims 1, 9 and the specification as sufficiently clear for a person skilled on the field of computer networks, claims 1 and 9 have been clarified by:

".. the frame being accepted by said physical layer and comprising a preamble, a start limiter field, a data link layer fieldbus data field and an end limiter field"

as disclosed on page 5, line 14 to page 6, line 3 of the specification and depicted in new Figure 3:

"The data coming from the use of a data link layer 70 are combined into a frame … which typically consist of a preamble, a start limiter field, a frame type field, a frame length field, a header check field, the data field, a data check field and an end limiter field. Since however, … no fast Ethernet compatible assembly is concerned, a matching layer 71 is required which matches the data frame prepared by the data link layer 70 of the fieldbus component 10, 20 to the physical layer 60 of the Fast Ethernet…"

As shown in new Figure 3 a typical Ethernet frame comprises a preamble, a start limitor field, a data field and an end-delimiter.

It should be noted that on page 5, line 20 the term "field data" might have been misunderstood since these data are indeed the matched data as provided by the matching layer. This understanding is based on page 5, lines 14 to 21.

New dependent claims 15 and 16 specify that the physical layer of claims 1 and 9 is constituted according to the IEEE 802.3u of the Fast Ethernet.

Claim Rejections - 35 USC 103

Claims 1, 5, 9, 10 and 14 are rejected as being unpatentable over Burns et al (Burns) in view of Julyan.

Claims 3, 4, 12 and 13 are rejected as being unpatentable over Burns and Julyan and further in view of Witkowski et al (Witkowski).

Valid rejection under 35 USC 103(a) requires evidence of a suggestion or motivation for one skilled in the art to combine prior art references to produce the claimed invention. US Court of Appeals for the Federal Circuit (*Ecolochem inc. v Southern California Edison Co., Fed. Cir.*, No. 99/1043, 9/7/00).

The best defense against hindsight-based obviousness analysis is the rigorous application of the requirement for showing a teaching or motivation to combine the prior art references, according to the court.

Burns, Julyan and Witkowski do not motivate or suggest to one skilled in the art to combine these references to produce Applicant's claimed invention.

In In Re Sang-Su Lee (00-1158) the Court of Appeals for the Federal Circuit rendered a decision confirming the above principles. The court analyzed 35 USC 103 requirements starting from the Administrative Procedure Act and held (citations omitted):

"Tribunals of the PTO are governed by the Administrative Procedure Act, and their rulings receive the same judicial deference as do tribunals of other administrative agencies.

"The Administrative Procedure Act, which governs the proceedings of administrative agencies and related judicial review, establishes a scheme of "reasoned decision making." Not only must an agency's decreed result be within

the scope of its lawful authority, but the process by which it reaches that result must be logical and rational

"As applied to the determination of patentability vel non when the issue is obviousness, it is fundamental that rejections under 35 USC §103 must be based on evidence comprehended by the language of that section. (Emphasis added). When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. (Emphasis added)

"The factual inquiry whether to combine references must be thorough and searching. It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with. Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. There must be some motivation, suggestion or teaching of the desirability of making the specific combination that was made by the Applicant. Teachings of references can be combined only if there is some suggestion or incentive to do so."

As stated above, **Burns, Julyan and Witkowski do not motivate or suggest to a person skilled in the art to combine these references to duplicate the claims of the present invention.**

A) Burns is not a citable prior art.

The latest priority date of the present application is November 6, 1998 and the US filing date is June 11, 1999, wherein the publication date of Burns is October 19, 1999, i.e. even later than the US filing date.

B) Novelty and Inventive Step of claims 1 and 9

The Examiner pointed out that Burns teaches a field device which is implemented according to the OSI layered reference model and thus includes inter alia a data layer and a physical layer. This aspect is very old prior art (see Tanenbaum as attached as Annex 1).

The Examiner further pointed out that Burns teaches all layers with the possible exception of a standardized medium - independent interface that connects the data link layer and the physical layer.

We respectfully disagree with the expression "possible exception" since Burns teaches field devices based on a fieldbus protocol (column 1, lines 59-64 of Burns) wherein a standardized medium-independent interface (MMI) can be only used with respect to the IEEE 802.3 (Ethernet) Standard as disclosed for example by Julyan (see for example column 1, lines 18-29; lines 41-47) and by McCool (page 342 and page 10 of our last reply to the last office action). It is important to note that according to IEEE 802.3 Standard both the data link layer and the physical layer are based on the IEEE 802.3 Standard (McCool, page 342, left column, last section). In contrast thereto, claims 1 and 9 teach a data link layer based on a fieldbus protocol and a physical layer based on a high speed transmission protocol such as Fast Ethernet.

As a result a standardized medium-independent interface (MII) can not be implemented in a field device according to Burns.

Furthermore, and more important, Burns teaches to couple fieldbus devices, for example basic devices 18, 20,24 and 28, link master devices 16, 26 to a low speed bus H1 (a fieldbus) and over bridges 30, 32 to a high speed transmission medium H2 (might be Ethernet) as shown in Figure 1 (see also column 8, lines 33-55). As a result Burns neither suggests nor hints to modify a field device at all. Quite different, Burns discloses connecting field devices without any changes via bridges to a high speed transmission medium H2.

In contrast thereto the present invention teaches to replace the fieldbus based physical layer of a known fieldbus component by a physical layer constituted for a high speed transmission and a matching layer as claimed in claims 1 and 9 in order to connect the fieldbus component directly to a high speed transmission medium by maintaining the medium access control of the fieldbus protocol based data link layer. It is an advantage of the present invention to avoid use of separate bridges to connect field devices to a high speed transmission medium.

Last but not least, we respectfully disagree to the Examiner's opinion, that Burns and Julyan can be combined.

The reasons are as follows:

a) Burns discloses to connect field devices without any changes via bridges to a high speed transmission medium H2.

b) As mentioned above, Julyan discloses only Ethernet architectures as McCool did. Therefore, the reconciliation sub layer (see Figure 1 of McCool and reference number 26 of Figure 2 of Julyan) is placed between two Ethernet-based layers, namely the data link layer and the physical layer. The function

of the reconciliation sub layer has been stated in our last Amendment (page 10, chapter A). In other words, the reconciliation sub layer matches to different Ethernet specification. Claims 1 and 9 are set forth a matching layer that matches data coming from a fieldbus protocol based data link layer to a physical layer based on a high speed transmission protocol such as Fast Ethernet.

In particular, Julyan does not provide any hint or suggestion to modify the field devices according to Burns to be coupled directly, i.e. without a bridge, to a high speed transmission line H2.

The same arguments are valid with respect to Liu et al. and Feuerstraeter et al., which are cited but not relied upon.

Wherefore consideration and allowance of the claims is respectfully requested.

A one-month extension of time in which to respond to the outstanding Office Action is hereby requested. Credit Card Payment Form PTO-2038 in enclosed to cover the prescribed Large Entity one-month extension fee of $110.00. Please charge any additional fees or credit any overpayments to Deposit Account 11-0665. A duplicate of this page is enclosed for this purpose.

Respectfully submitted,

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I hereby certify this correspondence is being submitted to Commissioner for Patents, Alexandria, VA 22313-1450 by facsimile transmission on March 1, 2004, fax number (703) 872-9306.

M. Robert Kestenbaum

Annex 1

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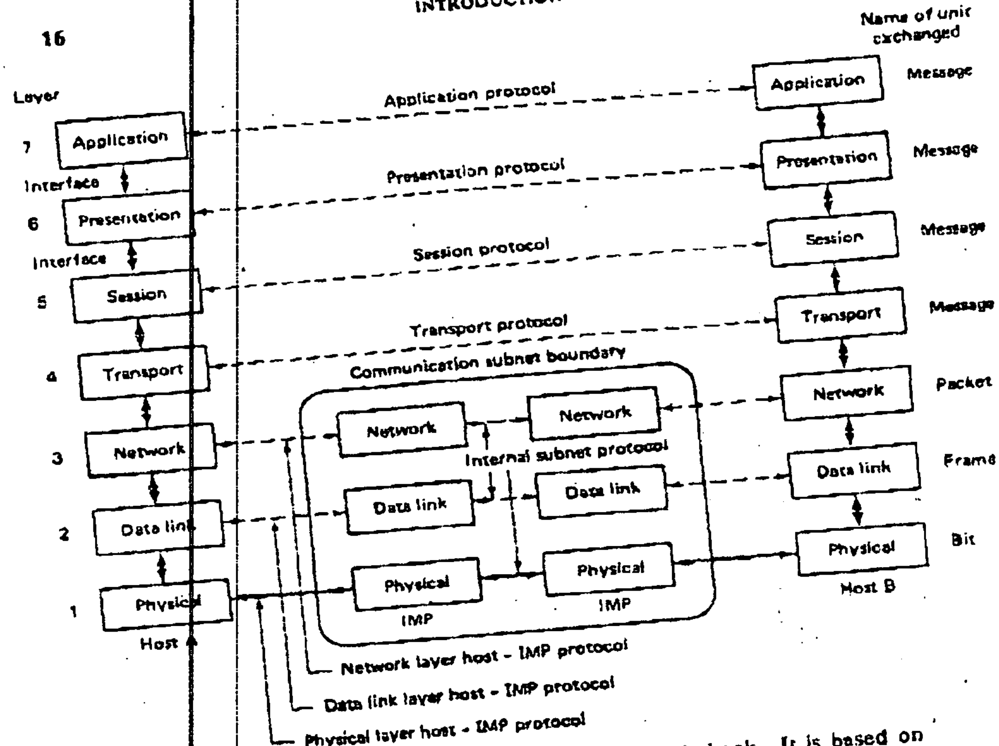
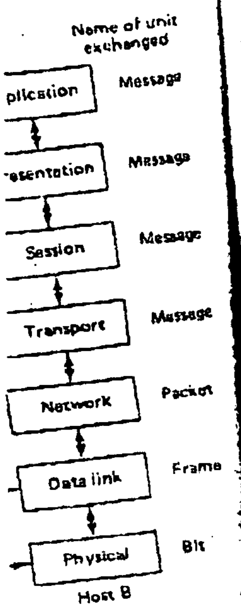


Fig. 1-7. The network architecture used in this book. It is based on the ISO OSI reference model.

1.4.1. The Physical Layer

The **physical layer** is concerned with transmitting raw bits over a commun
ication channel. The design issues have to do with making sure that when on
side sends a 1 bit, it is received by the other side as a 1 bit, not as a 0 bit. Ty
ical questions here are how many volts should be used to represent a 1 and ho
many for a 0, how many microseconds a bit occupies, whether transmissio
may proceed simultaneously in both directions, how the initial connectio
established and how it is torn down when both sides are finished, how ma
pins the network connector has and what each pin is used for. In some case
transmission facility consists of multiple physical channels, in which case
physical layer can make them look like a single channel, although higher la
can also perform this function. The design issues here largely deal
mechanical, electrical and procedural interfacing to the subnet.



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1.4.2. The Data Link Layer

The task of the data link layer is to take a raw transmission facility and transform it into a line that appears free of transmission errors to the network layer. It accomplishes this task done by breaking the input data up into **data frames**, transmitting the frames sequentially, and processing the **acknowledgement frames** sent back by the receiver. Since layer 1 merely accepts and transmits a stream of bits without any regard to meaning or structure, it is up to the data link layer to create and recognize frame boundaries. This can be accomplished by attaching special bit patterns to the beginning and end of the frame. These bit patterns can accidentally occur in the data, so special care must be taken to avoid confusion.

The term "frame" is not the official ISO term for the unit exchanged by layer 2 peer processes. The correct term is "physical-layer-service-data-unit." We hope our motivation for not always using the ISO nomenclature is now somewhat clearer.

A noise burst on the line can destroy a frame completely. In this case, the layer 2 software on the source machine must retransmit the frame. However, multiple transmissions of the same frame introduce the possibility of duplicate frames. A duplicate frame could be sent, for example, if the acknowledgement frame from the receiver back to the sender was destroyed. It is up to this layer to solve the problems caused by damaged, lost, and duplicate frames, so that layer 3 can assume it is working with an error-free (virtual) line. Layer 2 may offer several different services classes to layer 3, each of a different quality and with a different price.

Another issue that arises at layer 2 (and at most of the higher layers as well) is how to keep a fast transmitter from drowning a slow receiver in data. Some mechanism must be employed to let the transmitter know how much buffer space the receiver has at the moment. Typically, this mechanism and the error handling are integrated together.

If the line can be used to transmit data in both directions, this introduces a complication that the data link layer software must deal with. The problem that the acknowledgement frames for A to B traffic compete for the use of line with data frames for the B to A traffic. A clever solution (piggyback- has been devised; we will discuss it in detail later.

3. The Network Layer

The **network layer**, sometimes called the **communication subnet layer**, the operation of the subnet. Among other things, it determines the racteristics of the IMP-host interface, and how **packets**, the units of exchanged in layer 3, are routed within the subnet. A major design here is the division of labor between the IMPs and hosts, in particular ould ensure that all packets are correctly received at their destinations,